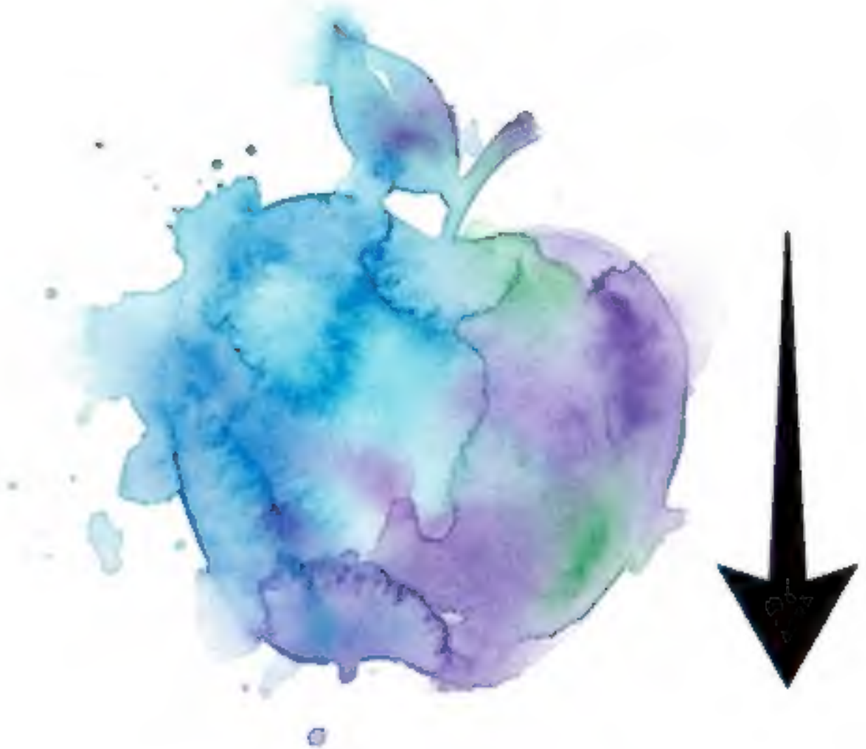

Chapter 6: How Forces Affect Motion

Play & Learn: A Smart Board Puzzle Challenge

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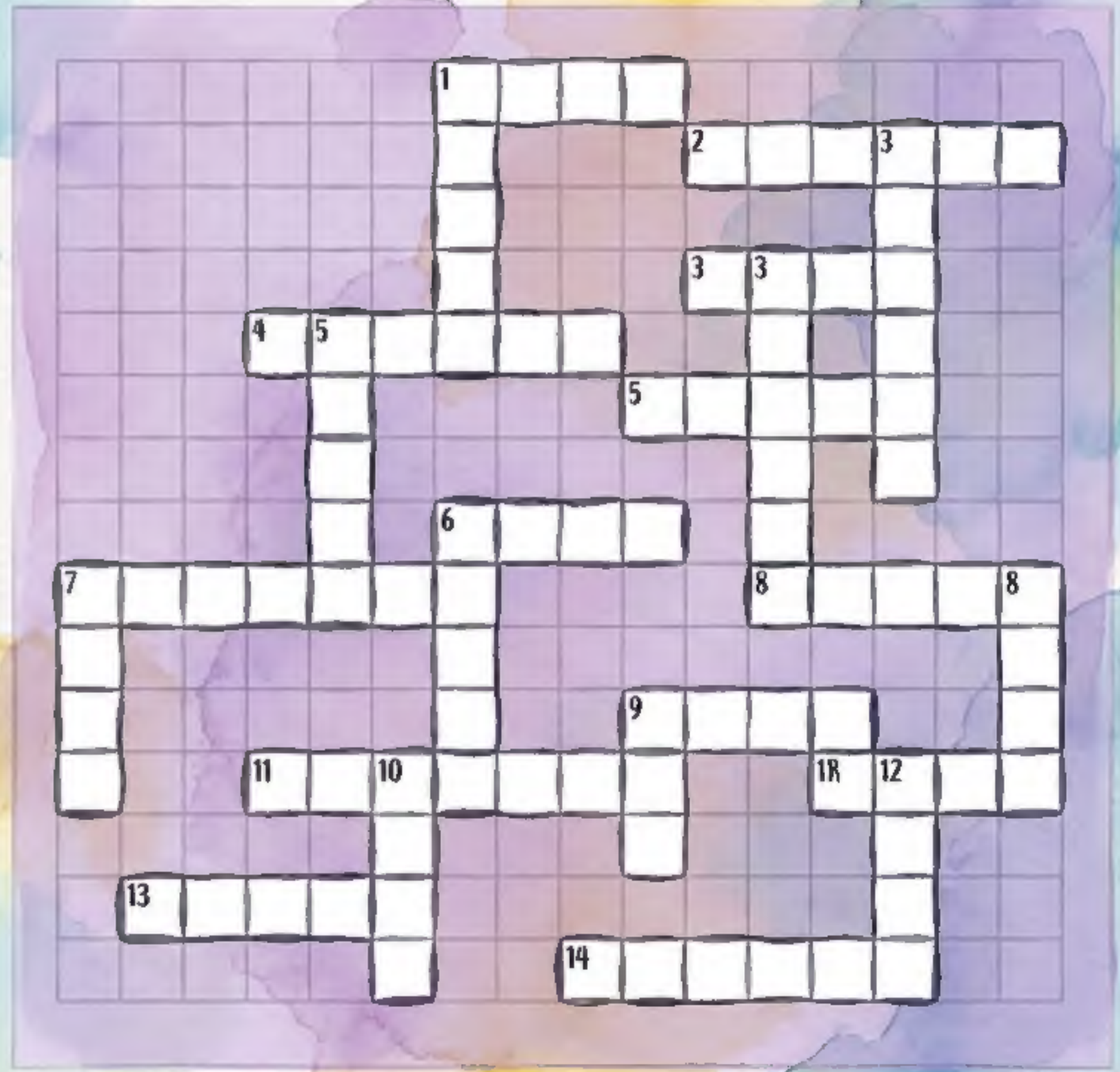
ACROSS

2. every _____ has an equal and opposite reaction (6)
4. the force that opposes relative sliding between surfaces (8)
7. _____ force — causes a change in motion (10)
10. the pulling force transmitted through a string (7)
13. the turning effect of a force (6)
14. _____ balance — a device that measures force (6)

DOWN

1. the force of gravity acting on a mass (6)
3. mass times velocity (8)
5. a body's resistance to a change in its state of motion (7)
6. the force of attraction between any two masses (7)
8. ____ forces — equal and opposite, produce no acceleration (8)
9. ____ force — requires touching, unlike gravity (7)
11. the SI unit of force (6)
12. ____ force — acts perpendicular to a surface (6)



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Race Rules

Solo: find all the words. Note your time at the top of the page.
Pairs: one partner finds across-and-down words, the other finds diagonals. First pair to complete the list wins.
Hard mode: cover the word list. Find as many chapter terms as you can in 5 minutes.
Champion move: for every word you find, say what it means out loud. No meaning, no point.

- ☐ MOMENTUM
- ☐ FRICTION
- ☐ BALANCED
- ☐ REACTION
- ☐ INERTIA
- ☐ TENSION
- ☐ GRAVITY
- ☐ CONTACT
- ☐ NEWTON
- ☐ TORQUE
- ☐ WEIGHT
- ☐ NORMAL
- ☐ KANTA
- ☐ FORCE
- ☐ MASS
- ☐ PUSH

M F O R C E S B M N H M B C L
W I C L F R E M K E H A N K X
E V C A S R T Y X W N T N T S
Z D V M R V I E U T E Y O H Z
H C X R A A E C U O U H I G J
I U T O I Z V K T N Q S T I R
Y U E N T E C M A I R U C E T
T S N X R K O M O N O P A W S
I Y S I E M N H A M T N E G D
V D I R N B T P B T E A R N R
A K O K I O A U Y Q I N I I A
R Z N N L E C P R J H X T D Z
G F S S A M T V T O Q Y Y U O
D C S D E C N A L A B Q N L M
G Q K E N D Y Q P U E W X N G

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Puzzle 3 · Scrambled Terms

Scrambled Letters	Clue	Your Answer
E N M O U M T M	(mass multiplied by velocity)	
A N C B N A D U L E	(forces that do not cancel and cause acceleration)	
C N F O I T I R	(opposes relative sliding between two surfaces)	
E B M Q R I I L I U U	(a state where net force is zero)	
I T M D U G E N A	(the size of a force, ignoring direction)	
E R D I P R N P C A E U L	(the direction of the normal force relative to a surface)	
N C O T O A T N N C	(a force like gravity that needs no touching)	
E I E S N S A C R T	(another word closely linked to inertia)	

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Puzzle 4 · Odd One Out

Push · Pull · Twist · Colour

Because... _____

Gravity · Magnetism · Friction · Electrostatic force

Because... _____

Newton · Kilogram · Metre · Second (this chapter's star unit)

Because... _____

Tension · Normal force · Friction · Gravity (contact vs non-contact)

Because... _____

Balanced forces · Zero acceleration · Constant velocity · Speeding up

Because... _____

Spring balance · Tarazu · Kanta · Thermometer

Because... _____

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Scoring	
Each letter tile used:	Its tile value
Word is a term from this chapter:	× 2
Word is 8 letters or longer:	+ 10 bonus
You can state its meaning correctly:	+ 5
You can connect it to a real-life example:	+ 3
Word is not in this chapter (challenged and lost):	– 5

How a Round Works

Player builds a word. Any opponent may challenge within 10 seconds.

Builder states the meaning to claim the +5 bonus.

Play 6 rounds. Highest total wins.

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Puzzle 6 · Who Am I? — Clue Cards

1. I am a body's resistance to changing its motion.
2. A sudden bus brake reveals me in your own body.
3. I am inertia.

1. I am mass multiplied by velocity.
2. A moving truck has more of me than a moving bicycle at the same speed.
3. I am momentum.

1. I am the SI unit of force.
2. I am named after a famous scientist.
3. I am the newton.

1. I pull through a taut string.
2. A kite stays up partly because of me.
3. I am tension.

1. I oppose relative sliding between two surfaces.
2. Without me you could not walk.
3. I am friction.

1. I am the turning effect of a force.
2. Opening a door with a push far from the hinge uses more of me for less effort.
3. I am torque.

1. When we are equal and opposite, nothing accelerates.
2. When we are not equal, something starts moving.
3. I am a pair of forces (balanced/unbalanced).

1. I act perpendicular to a surface.
2. I hold you up when you stand on the floor.
3. I am the normal force.

1. I attract any two masses toward each other.
2. I keep the Moon orbiting Earth.
3. I am gravity.

1. I am the force of gravity acting on your mass.
2. I change on the Moon even though your mass does not.
3. I am weight.

1. For every one of me there is an equal and opposite reaction.
2. I am Newton's Third Law in one word.
3. I am action.

1. I need no contact at all.
2. Gravity and magnetism are examples of me.
3. I am a non-contact force.

Scoring: Guessed after clue 1 = 5 pts · After clue 2 = 3 pts · After clue 3 = 1 pt

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Puzzle 7 · True or False Sprint

1. Inertia is a body's tendency to resist a change in motion. ☐ True ☐ False
2. Momentum is mass divided by velocity. ☐ True ☐ False
3. The newton is the SI unit of mass. ☐ True ☐ False
4. Friction always acts to oppose relative motion. ☐ True ☐ False
5. Balanced forces cause an object to accelerate. ☐ True ☐ False
6. An unbalanced force changes an object's state of motion. ☐ True ☐ False
7. The normal force acts parallel to a surface. ☐ True ☐ False
8. Gravity is a non-contact force. ☐ True ☐ False
9. Weight changes depending on gravitational field strength; mass does not. ☐ True ☐ False
10. Every action has an equal and opposite reaction. ☐ True ☐ False
11. Torque is the turning effect of a force. ☐ True ☐ False
12. Tension can only push, never pull. ☐ True ☐ False
13. A heavier object always has more inertia than a lighter one. ☐ True ☐ False
14. A spring balance measures mass directly. ☐ True ☐ Fal

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Puzzle 8 · Bingo Card Creation

Inertia	Momentum	Newton	Tension
Friction	Torque	Balanced force	Unbalanced force
Normal force	Gravity	Weight	Spring balance
Contact force	Non-contact force	Action-reaction	Equilibrium

Teacher Note:

Students: Choose any 16 words. Fill your physical cards. One word per box.

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Puzzle 9 · Two Truths and a Lie

Set 1

(a) A heavier object has more inertia.
(b) Inertia depends on velocity.
(c) Inertia is why you lurch forward when a bus brakes.

The lie is _____. Corrected: _____

Set 2

(a) Balanced forces cause zero acceleration.
(b) Balanced forces cause an object to speed up.
(c) A book resting on a table experiences balanced forces.

The lie is _____. Corrected: _____

Set 3

(a) Weight is the same as mass.
(b) Weight changes with location (Earth vs Moon).
(c) Mass stays the same everywhere.

The lie is _____. Corrected: _____

Set 4

(a) Friction always helps motion.
(b) Friction can be reduced by lubrication.
(c) Friction opposes relative sliding.

The lie is _____. Corrected: _____

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Puzzle 10 · The Escape Challenge

The Inertia Gate:
Count the letters in INERTIA.

Digit: [ ]

The Force Gate:
How many of Newton's Laws of Motion are there? Use that number.

Digit: [ ]

The Contact Gate:
How many contact forces are named in this chapter (tension, normal, friction)? Use that number.

Digit: [ ]

The Momentum Gate:
Momentum = mass × velocity. Count the words in that formula's definition (three words: mass, times, velocity). Use that number.

Digit: [ ]

The Torque Gate:
Count the letters in TORQUE.

Digit: [ ]

EXIT CODE: [ ][ ][ ][ ]

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